

SEQUENCE LISTING

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<120> FimH Adhesin Proteins and Methods of Use

<130> 469201-549

<150> US/60/216,750

<151> 2000-07-07

<160> 64

<170> PatentIn version 3.0

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tgcgatgttt ctgctcgta tgtcaccgtt actctgcgg actaccctgg ttcatgtgcc	540
attcctctta ccgtttattt tgcaaaaagc caaaacctgg ggtattacct ctccggcaca	600
accgcagatg cgggcaactc gatttcacc aataccgctt cgttttcacc tgacaggc	660
gtcggcgtac agttgacgac caacggtagc attattccag cgaataaacac ggtatcgta	720
ggagcagtag ggacttcggc ggtaagtctg ggattaacgg caaattatgc acgtaccgga	780
gggcaggtga ctgcaggaa tgtgcaatcg attattggcg tgactttgt ttatcaa	837

<210> 16
 <211> 837
 <212> DNA
 <213> E. coli

<400> 16

atcgccctgt	aaaccgccaa	tggcaccgct	atccctattg	gcggtggcag	cgc	ccaatgttt	60	
tatgtaaacc	ttgcgc	ccgc	cgt	aatgttg	ggcaaaacc	tggcgttaga	tcttcgacg	120
caa	atctttt	gccataacga	ttacccggaa	accattacag	actatgtcac	actgcaacga	180	
gg	ttccggctt	atggcggcgt	gttatctcat	tttccggga	ccgtaaaata	tagtggcagt	240	
ag	ctatccat	ttcctaccac	cagcgaaacg	ccgcgcgtt	tttataattc	gagaacggat	300	
aag	ccgtggc	cggtggcgt	ttatttgacg	cctgtgagca	gtgcgggtgg	ggtggcgatt	360	
aagg	cgtggct	cattaatggc	tgtctaatt	ttgcgacaga	ccaataacta	taacagcgat	420	
gatt	ccagt	ttgtgtggaa	tatttacg	ccaaataacta	taacagcgat	480		
tgt	atgtttt	ctgctcgta	tgtcaccgtt	actctgc	actaccctgg	ttcagtgc	540	
att	cctctta	ccgtttattt	tgcaaaagc	caaaacctgg	ggtattac	ctccggcaca	600	
acc	cagatg	cgggcaactc	gattttcacc	aataatgtt	ttgcacaggc	720		
gtc	ggcgtac	agttaacgcg	caacggtagc	attatccag	cgaataaacac	ggtatcg	780	
gg	gac	ttcg	ggtaagtctg	ggattaacgg	caaattacgc	acgtaccgg	837	
ggc	agg	gt	tgcaatcg	attattggcg	tgactttgt	ttatcaa		

<210> 17
 <211> 837
 <212> DNA
 <213> E. coli

<400> 17

ttcgccctgt	aaaccgccaa	tggtaccgct	atccctattg	gcggtggcag	cgc	ccaatgttt	60	
tatgtaaacc	ttgcgc	ccgc	cgt	aatgttg	ggcaaaacc	tggcgttaga	tcttcgacg	120
caa	atctttt	gccataacga	ttatccggaa	accattacag	actatgtcac	actgcaacga	180	
gg	ctcg	ccgcgtt	atggcggcgt	gttatctat	tttccggga	ccgtaaaata	tagtggcagt	240
ag	ctatccat	ttcctaccac	cagcgaaacg	ccgcgcgtt	tttataattc	gagaacggat	300	
aag	ccgtggc	cggtggcgt	ttatttgacg	cctgtgagca	gtgcgggcgg	ggtggcgatt	360	
aaag	cgtggct	cattaattgc	cgtgcttatt	ttgcgacaga	ccaacaacta	taacagcgat	420	
gatt	ccagt	ttgtgtggaa	tatttacg	aataatgtt	ttgcacaggc	720		
tgc	atgtttt	ctgctcgta	tgtcaccgtt	actctgc	actaccgtgg	ttcagtgc	540	
att	cctctta	ccgtttattt	tgcaaaagc	caaaacctgg	ggtattac	ctccggcaca	600	
cac	cagatg	cgggcaactc	gattttcacc	aataaccgt	cg	tgcacaggc	660	
gtc	ggcgtac	agttaacgcg	caacggtagc	attatccag	cgaataaacac	ggtatcg	720	
gg	gac	ttcg	ggtaagtctg	ggattaacgg	caaattatgc	acgtaccgg	780	
ggc	agg	gt	tgcaatcg	attattggcg	tgactttgt	ttatcaa		

<210> 18
 <211> 837
 <212> DNA
 <213> E. coli

<400> 18

ttcgccctgt	aaaccgccaa	tggtaccgct	atccctattg	gcggtggcag	cgc	ccaatgttt	60	
tatgtaaacc	ttgcgc	ccgc	cgt	aatgttg	ggcaaaacc	tggcgttaga	tcttcgacg	120
caa	atctttt	gccataacga	ttacccggaa	accattacag	actatgtcac	actgcaacga	180	
gg	ttccggctt	atggcggcgt	gttatctat	tttccggga	ccgtaaaata	taatggcagt	240	
ag	ctatcctt	tccctactac	cagcgaaacg	ccgcgggtt	tttataattc	gagaacggat	300	
aag	ccgtggc	cggtggcgt	ttatttgacg	cctgtgagca	gtgcgggggg	agttggcgatt	360	
aaag	cgtggct	cattaattgc	cgtgcttatt	ttgcgacaga	ccaacaacta	taacagcgat	420	

gattccagt	ttgtgtggaa	tatttacgcc	aataatgatg	tggtggtgcc	cactggcgcc	480
tgcgtatgtt	ctgctcgtga	tgtcacccgtt	actctgcggg	actaccctgg	ttcagtgccg	540
attcccttta	cggttatttgc	tgcaaaaagc	caaaacctgg	ggtattacct	ctccggcaca	600
accgcagatg	cgggcaactc	gatttcacc	aataccgcgt	cgttttacc	cgcgcaggc	660
gtcggcgtac	agttggcgcg	caacggtacg	gttattccag	cgaataaacac	ggtatcgta	720
ggagcagtag	ggacttcggc	ggtaagtctg	ggattaacgg	caaattacgc	acgtaccgga	780
ggcaggtga	ctgcaggaa	tgtcaatcg	attattggcg	tgacttttgt	ttatcaa	837

<210> 19
<211> 837
<212> DNA
<213> E. coli

<400> 19						
ttcgcctgt	aaaccgccaa	tggtaccgca	atccctatttgc	cggtggcag	cgttaatgtt	60
tatgtaaacc	ttgcgcctgc	cgtgaatgt	ggcaaaaacc	tggtcgtaga	tctttcgacg	120
caaatctttt	gccataacga	ttacccagaa	accattacag	actatgtcac	actgcaacga	180
ggttcggcctt	atggcggcgt	gttatctgt	ttttccggaa	ccgtaaaata	taatggcagt	240
agctatccctt	tccctactac	cagcggaaacg	ccgcgggtt	tttataatttgc	gagaacggat	300
aagccgtggc	cggtggcgct	ttatgtacg	ctggtgagca	gtgcgggggg	agtggcgatt	360
aaagctggct	cattaatttgc	cgtgttatttgc	ttgcgacaga	ccaaacaacta	taacagcgat	420
gatttccagt	ttgtgtggaa	tatttacgcc	aataatgatg	tggtggtgcc	cactggcgcc	480
tgtgtatgtt	ctgctcgtga	tgtcacccgtt	actctgcggg	actaccctgg	ttcagtgccg	540
attcccttta	ccgtttatttgc	tgcaaaaagc	caaaacctgg	ggtattacct	atccggcaca	600
accgcagatg	cgggcaactc	gatttcacc	aataccgcgt	cgttttacc	cgcgcaggc	660
gtcggcgtac	agttgacgcg	caacggtacg	attattccag	cgaataaacac	ggtatcgta	720
ggagcagtag	ggacttcggc	ggtaagtctg	ggattaacgg	caaattacgc	acgtaccgga	780
ggcaggtga	ctgcaggaa	tgtcaatcg	attattggcg	tgacttttgt	ttatcaa	837

<210> 20
<211> 837
<212> DNA
<213> E. coli

<400> 20						
ttcgcctgt	aaaccgccaa	tggtaccgct	atccctatttgc	cggtggcag	cgttaatgtt	60
tatgtaaacc	ttgcgcctgc	cgtgaatgt	ggcaaaaacc	tggtcgtaga	tctttcgacg	120
caaatctttt	gccataacga	ttatccggaa	accattacag	actatgtcac	actgcaacga	180
ggctcggcctt	atggcggcgt	gttatctaat	ttttccggaa	ccgtaaaata	tagtggcagt	240
agctatccat	ttccgaccac	cagcggaaacg	ccgcgggtt	tttataatttgc	gagaacggat	300
aagccgtggc	cggtggcgct	ttatgtacg	cctgtgagca	gtgcggggcg	ggtggcgatt	360
aaagctggct	cattaatttgc	cgtgttatttgc	ttgcgacaga	ccaaaaacta	taacagcgat	420
gatttccagt	ttgtgtggaa	tatttacgcc	aataatgatg	tggttagtgcc	tactggcgcc	480
tgcgtatgtt	ctgctcgtga	tgtcacccgtt	actctgcggg	actaccctgg	ttcagtgcca	540
attcccttta	ccgtttatttgc	tgcaaaaagc	caaaacctgg	ggtattacct	ctccggcaca	600
accgcagatg	cgggcaactc	gatttcacc	aataccgcgt	cgttttacc	agcgcaggc	660
gtcggcgtac	agttgacgcg	caacggtacg	attattccag	cgaataaacac	ggtatcgta	720
ggaacagtag	gaacttcggc	ggtaagtctg	ggattaacgg	caaattacgc	acgtaccgga	780
ggcaggtga	ctgcaggaa	tgtcaatcg	attattggcg	tgacttttgt	ttatcaa	837

<210> 21
<211> 837
<212> DNA
<213> E. coli

<400> 21	ttcgccctgta aaaccgccaa tggtaccgct atccctattg gcgggtggcag cgccaatgtt tatgtaaacc ttgcgcgcgt cgtgaatgtg gggcaaaaacc tggtcgtgga tctttcgacg caaatatttt gccataaacga ttatccggaa accattacag actatgtcac actgcaacaga ggctcggtt atggcggcgt gttatctaattttccggaa ccgtaaaata tagtggcagt agctatccat ttccattaccac cagcgaaacg ccgcgcgttg ttataattc gagaacggat aagccgtggc cggtggcgtt ttatttgacg cctgtgagca gtgcggcgg ggtggcgatt aaagctggct cattaattgc cgtgcttatttgc ttgcgacaga ccaacaacta taacagcgat gatttccagt ttgtgtggaa tatttacgcc aataatgtat tggtgtgtcc tactggcggc tgcgatgttt ctgctcgta tgcacccgtt actctgccgg actaccctgg ttcaagtgc attccctcta ccgtttatttgc tgcgaaaaggc caaaacctgg ggtattacct ctccggcaca accgcagatg cggcaactc gattttcacc aataccgcgt cgtttcacc tgcacaggc gtcggcgtac agttgacgcg caacggtagc attattccag cgaataacac ggtatcgta ggagcagtag ggacttcggc ggtgagtcg ggattaacgg caaattatgc acgtaccgg gggcaggtga ctgcaggaa tgtgcaatcg attattggc tgacttttgt ttatcaa	60 120 180 240 300 360 420 480 540 600 660 720 780 837
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<210> 22
<211> 837
<212> DNA
<213> E. coli

<400> 22	ttcgccctgta aaaccgccaa tggtaccgca atccctattt gcgggtggcag cgccaatgtt tatgtaaacc ttgcgcctgc cgtgaatgtg gggcaaaacc tggtcgtaga tctttcgacg caaatcttt gcataaacga ttacccagaa accattacag actatgtcac actgcaacaga ggtgcggctt atggcggcgt gttatctagt tttccggga ccgtaaaata taatggcagt agctatcctt tcctactac cagcgaaacg ccgcgggttg tttataattc gagaacggat aagccgtggc cggtggcgct ttatttgcac ccggtgagca gtgcgggggg agtggcgatt aaagctggct cattaattgc cgtgcttatt ttgcgacaga ccaacaacta taacagcgat gatttccagt ttgtgtggaa tatttacgcc aataatgtat tggtgtgtcc cactggcggc tgcgtgttt ctgctcgta tgcacccgtt actctgtccgg actaccctgg ttcatgtcccc attcctctta ccgtttattt tgcgaaaaggc caaaacctgg ggtattacct ctccggcaca accgcagatg cggcaactc gattttcacc aataccgcgt cgtttccacc cgccgaggcc gtccggcgatc agttgacgcg caacggtagc attattccag cgaataaacac ggtatcgta ggagcagtag ggacttcggc ggtaagtctg ggattaacgg caaattacgc acgtaccgg gggcaggtga ctgcaggaa tggcaatcg attattggcg tgacttttgt ttatcaa	60 120 180 240 300 360 420 480 540 600 660 720 780 837
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<210> 23
<211> 279
<212> PRT
<213> *E. coli*

<400> 23
Phe Ala Cys Lys Thr Ala Asn Gly Thr Ala Ile Pro Ile Gly Gly Gly
1 5 10 15

Ser Ala Asn Val Tyr Val Asn Leu Ala Pro Val Val Asn Val Gly Gln
20 25 30

Asn Leu Val Val Asp Leu Ser Thr Gln Ile Phe Cys His Asn Asp Tyr
35 40 45

Pro Glu Thr Ile Thr Asp Tyr Val Thr Leu Gln Arg Gly Ser Ala Tyr
50 55 60

Gly Gly Val Leu Ser Asn Phe Ser Gly Ile Val Lys Tyr Ser Gly Ser

65	70	75	80
Ser Tyr Pro Phe Pro Thr Thr Ser Glu Thr Pro Arg Val Val Tyr Asn			
85	90		95
Ser Arg Thr Asp Lys Pro Trp Pro Val Ala Leu Tyr Leu Thr Pro Val			
100	105		110
Ser Ser Ala Gly Gly Val Ala Ile Lys Ala Gly Ser Leu Ile Ala Val			
115	120		125
Leu Ile Leu Arg Gln Thr Asn Asn Tyr Asn Ser Asp Asp Phe Gln Phe			
130	135		140
Val Trp Asn Ile Tyr Ala Asn Asn Asp Val Val Val Pro Thr Gly Gly			
145	150		155
Cys Asp Ala Ser Ala Arg Asp Val Thr Val Thr Leu Pro Asp Tyr Arg			
165	170		175
Gly Ser Val Pro Ile Pro Leu Thr Val Tyr Cys Ala Lys Ser Gln Asn			
180	185		190
Leu Gly Tyr Tyr Leu Ser Gly Thr His Ala Asp Ala Gly Asn Ser Ile			
195	200		205
Phe Thr Asn Thr Ala Ser Phe Ser Pro Ala Gln Gly Val Gly Val Gln			
210	215		220
Leu Ala Arg Asn Gly Thr Val Ile Pro Ala Asn Asn Thr Val Ser Leu			
225	230		235
Gly Ala Val Gly Thr Ser Ala Val Ser Leu Gly Leu Thr Ala Asn Tyr			
245	250		255
Ala Arg Thr Gly Gly Gln Val Thr Ala Gly Asn Val Gln Ser Ile Ile			
260	265		270
Gly Val Thr Phe Val Tyr Gln			
275			
<210> 24			
<211> 279			
<212> PRT			
<213> E. coli			
<400> 24			
Phe Ala Cys Lys Thr Ala Asn Gly Thr Ala Ile Pro Ile Gly Gly Gly			
1	5		10
15			
Ser Ala Asn Val Tyr Val Asn Leu Ala Pro Ala Val Asn Val Gly Gln			
20	25		30
Asn Leu Val Val Asp Leu Ser Thr Gln Ile Phe Cys His Asn Asp Tyr			
35	40		45
Pro Glu Thr Ile Thr Asp Tyr Val Thr Leu Gln Arg Gly Ser Ala Tyr			
50	55		60

Gly Gly Val Leu Ser Ser Phe Ser Gly Ile Val Lys Tyr Asn Gly Ser
 65 70 75 80

Ser Tyr Pro Phe Pro Thr Thr Ser Glu Thr Pro Arg Val Val Tyr Asn
 85 90 95

Ser Arg Thr Asp Lys Pro Trp Pro Val Ala Leu Tyr Leu Thr Pro Val
 100 105 110

Ser Ser Ala Gly Gly Val Ala Ile Lys Ala Gly Ser Leu Ile Ala Val
 115 120 125

Leu Ile Leu Arg Gln Thr Asn Asn Tyr Asn Ser Asp Asp Phe Gln Phe
 130 135 140

Val Trp Asn Ile Tyr Ala Asn Asn Asp Val Val Val Pro Thr Gly Gly
 145 150 155 160

Cys Asp Ala Ser Ala Arg Asp Val Thr Val Thr Leu Pro Asp Tyr Arg
 165 170 175

Gly Ser Val Pro Ile Pro Leu Thr Val Tyr Cys Ala Lys Ser Gln Asn
 180 185 190

Leu Gly Tyr Tyr Leu Ser Gly Thr His Ala Asp Ala Gly Asn Ser Ile
 195 200 205

Phe Thr Asn Thr Ala Ser Phe Ser Pro Ala Gln Gly Val Gly Val Gln
 210 215 220

Leu Thr Arg Asn Gly Thr Ile Ile Pro Ala Asn Asn Thr Val Ser Leu
 225 230 235 240

Gly Ala Val Gly Thr Ser Ala Val Ser Leu Gly Leu Thr Ala Asn Tyr
 245 250 255

Ala Arg Thr Gly Gly Gln Val Thr Ala Gly Asn Val Gln Ser Ile Ile
 260 265 270

Gly Val Thr Phe Val Tyr Gln
 275

<210> 25
 <211> 279
 <212> PRT
 <213> E. coli

<400> 25
 Phe Ala Cys Lys Thr Ala Asn Gly Thr Ala Ile Pro Ile Gly Gly Gly
 1 5 10 15

Ser Ala Asn Val Tyr Val Asn Leu Ala Pro Ala Val Asn Val Gly Gln
 20 25 30

Asn Leu Val Val Asp Leu Ser Thr Gln Ile Phe Cys His Asn Asp Tyr
 35 40 45

Pro Glu Thr Ile Thr Asp Tyr Val Thr Leu Gln Arg Gly Ala Ala Tyr
 50 55 60
 Gly Gly Val Leu Ser Ser Phe Ser Gly Thr Val Lys Tyr Asn Gly Ser
 65 70 75 80
 Ser Tyr Pro Phe Pro Thr Thr Ser Glu Thr Pro Arg Val Val Tyr Asn
 85 90 95
 Ser Arg Thr Asp Lys Pro Trp Pro Val Ala Leu Tyr Leu Thr Pro Val
 100 105 110
 Ser Ser Ala Gly Gly Val Ala Ile Lys Ala Gly Ser Leu Ile Ala Val
 115 120 125
 Leu Ile Leu Arg Gln Thr Asn Asn Tyr Asn Ser Asp Asp Phe Gln Phe
 130 135 140
 Val Trp Asn Ile Tyr Ala Asn Asn Asp Val Val Val Pro Thr Gly Gly
 145 150 155 160
 Cys Asp Val Ser Ala Arg Asp Val Thr Val Thr Leu Pro Asp Tyr Arg
 165 170 175
 Gly Ser Val Pro Ile Pro Leu Thr Val Tyr Cys Ala Lys Ser Gln Asn
 180 185 190
 Leu Gly Tyr Tyr Leu Ser Gly Thr His Ala Asp Ala Gly Asn Ser Ile
 195 200 205
 Phe Thr Asn Thr Ala Ser Phe Ser Pro Ala Gln Gly Val Gly Val Gln
 210 215 220
 Leu Thr Arg Asn Gly Thr Ile Ile Pro Ala Asn Asn Thr Val Ser Leu
 225 230 235 240
 Gly Ala Val Gly Thr Ser Ala Val Ser Leu Gly Leu Thr Ala Asn Tyr
 245 250 255
 Ala Arg Thr Gly Gly Gln Val Thr Ala Gly Asn Val Gln Ser Ile Ile
 260 265 270
 Gly Val Thr Phe Val Tyr Gln
 275
 <210> 26
 <211> 279
 <212> PRT
 <213> E. coli
 <400> 26
 Phe Ala Cys Lys Thr Ala Asn Gly Thr Ala Ile Pro Ile Gly Gly Gly
 1 5 10 15
 Ser Ala Asn Val Tyr Val Asn Leu Ala Pro Ala Val Asn Val Gly Gln
 20 25 30
 Asn Leu Val Val Asp Leu Ser Thr Gln Ile Phe Cys His Asn Asp Tyr

35

40

45

Pro Glu Thr Ile Thr Asp Tyr Val Thr Leu Gln Arg Gly Ala Ala Tyr
 50 55 60

Gly Gly Val Leu Ser Ser Phe Ser Gly Thr Val Lys Tyr Asn Gly Ser
 65 70 75 80

Ser Tyr Pro Phe Pro Thr Thr Ser Glu Thr Pro Arg Val Val Tyr Asn
 85 90 95

Ser Arg Thr Asp Lys Pro Trp Pro Val Ala Leu Tyr Leu Thr Pro Val
 100 105 110

Ser Ser Ala Gly Gly Val Ala Ile Lys Ala Gly Ser Leu Ile Ala Val
 115 120 125

Leu Ile Leu Arg Gln Thr Asn Asn Tyr Asn Ser Asp Asp Phe Gln Phe
 130 135 140

Val Trp Asn Ile Tyr Ala Asn Asn Asp Val Val Val Pro Thr Gly Gly
 145 150 155 160

Cys Asp Val Ser Ala Arg Asp Val Thr Val Thr Leu Pro Asp Tyr Arg
 165 170 175

Gly Ser Val Pro Ile Pro Leu Thr Val Tyr Cys Ala Lys Ser Gln Asn
 180 185 190

Leu Gly Tyr Tyr Leu Ser Gly Thr His Ala Asp Ala Gly Asn Ser Ile
 195 200 205

Phe Thr Asn Thr Ala Ser Phe Ser Pro Ala Gln Gly Val Gly Val Gln
 210 215 220

Leu Thr Arg Asn Gly Thr Ile Ile Pro Ala Asn Asn Thr Val Ser Leu
 225 230 235 240

Gly Ala Val Gly Thr Ser Ala Val Ser Leu Gly Leu Thr Ala Asn Tyr
 245 250 255

Ala Arg Thr Gly Gly Gln Val Thr Ala Gly Asn Val Gln Ser Ile Ile
 260 265 270

Gly Val Thr Phe Val Tyr Gln
 275

<210> 27

<211> 279

<212> PRT

<213> E. coli

<400> 27

Phe Ala Cys Lys Thr Ala Asn Gly Thr Ala Ile Pro Ile Gly Gly Gly
 1 5 10 15

Ser Ala Asn Val Tyr Val Asn Leu Ala Pro Ala Val Asn Val Gly Gln
 20 25 30

Asn Leu Val Val Asp Leu Ser Thr Gln Ile Phe Cys His Asn Asp Tyr
 35 40 45

 Pro Glu Thr Ile Thr Asp Tyr Val Thr Leu Gln Arg Gly Ser Ala Tyr
 50 55 60

 Gly Gly Val Leu Ser Asn Phe Ser Gly Thr Val Lys Tyr Ser Gly Ser
 65 70 75 80

 Ser Tyr Pro Phe Pro Thr Thr Ser Glu Thr Pro Arg Val Val Tyr Asn
 85 90 95

 Ser Arg Thr Asp Lys Pro Trp Pro Val Ala Leu Tyr Leu Thr Pro Val
 100 105 110

 Ser Ser Ala Gly Gly Val Ala Ile Lys Ala Gly Ser Leu Ile Ala Val
 115 120 125

 Leu Ile Leu Arg Gln Thr Asn Asn Tyr Asn Ser Asp Asp Phe Gln Phe
 130 135 140

 Val Trp Asn Ile Tyr Ala Asn Asn Asp Val Val Val Pro Thr Gly Gly
 145 150 155 160

 Cys Asp Val Ser Ala His Asp Val Thr Val Thr Leu Pro Asp Tyr Arg
 165 170 175

 Gly Ser Val Pro Ile Pro Leu Thr Val Tyr Cys Ala Lys Ser Gln Asn
 180 185 190

 Leu Gly Tyr Tyr Leu Ser Gly Thr His Ala Asp Ala Gly Asn Ser Ile
 195 200 205

 Phe Thr Asn Thr Ala Ser Phe Ser Pro Ala Gln Gly Val Gly Val Gln
 210 215 220

 Leu Thr Arg Asn Gly Thr Ile Ile Pro Ala Asn Asn Thr Val Ser Leu
 225 230 235 240

 Gly Ala Val Gly Thr Ser Ala Val Ser Leu Gly Leu Thr Ala Asn Tyr
 245 250 255

 Ala Arg Thr Gly Gly Gln Val Thr Ala Gly Asn Val Gln Ser Ile Ile
 260 265 270

 Gly Val Thr Phe Val Tyr Gln
 275

 <210> 28
 <211> 279
 <212> PRT
 <213> E. coli

 <400> 28
 Phe Ala Cys Lys Thr Ala Asn Gly Thr Ala Ile Pro Ile Gly Gly Gly
 1 5 10 15

Ser Ala Asn Val Tyr Val Asn Leu Ala Ile Ala Val Asn Val Gly Gln
20 25 30

Asn Leu Val Val Asp Leu Ser Thr Gln Ile Phe Cys His Asn Asp Tyr
35 40 45

Pro Glu Thr Ile Thr Asp Tyr Val Thr Leu Gln Arg Gly Ser Ala Tyr
50 55 60

Gly Gly Val Leu Ser Asn Phe Ser Gly Thr Val Lys Tyr Ser Gly Ser
65 70 75 80

Ser Tyr Pro Phe Pro Thr Thr Ser Glu Thr Pro Arg Val Val Tyr Asn
85 90 95

Ser Arg Thr Asp Lys Pro Trp Pro Val Ala Leu Tyr Leu Thr Pro Val
100 105 110

Ser Ser Ala Gly Gly Val Val Ile Lys Ala Gly Ser Leu Ile Ala Val
115 120 125

Leu Ile Leu Arg Gln Thr Asn Asn Tyr Asn Ser Asp Asp Phe Gln Phe
130 135 140

Val Trp Asn Ile Tyr Ala Asn Asn Asp Val Val Val Pro Thr Gly Gly
145 150 155 160

Cys Asp Val Ser Ala Arg Asp Val Thr Val Thr Leu Pro Asp Tyr Arg
165 170 175

Gly Ser Val Pro Ile Pro Leu Thr Val Tyr Cys Ala Lys Ser Gln Asn
180 185 190

Leu Gly Tyr Tyr Leu Ser Gly Thr His Ala Asp Ala Gly Asn Ser Ile
195 200 205

Phe Thr Asn Thr Ala Ser Phe Ser Pro Ala Gln Gly Val Gly Val Gln
210 215 220

Leu Thr Arg Asn Gly Thr Ile Ile Pro Ala Asn Asn Thr Val Ser Leu
225 230 235 240

Gly Ala Val Gly Thr Ser Ala Val Ser Leu Gly Leu Thr Ala Asn Tyr
245 250 255

Ala Arg Thr Gly Gly Gln Val Thr Ala Gly Asn Val Gln Ser Ile Ile
260 265 270

Gly Ala Thr Phe Val Tyr Gln
275

<210> 29

<211> 279

<212> PRT

<213> E. coli

<400> 29

Phe Ala Cys Lys Thr Ala Asn Gly Thr Ala Ile Pro Ile Gly Gly Gly

1	5	10	15
Ser Ala Asn Val Tyr Val Asn Leu Ala Pro Val Val Asn Val Gly Gln			
20	25	30	
Asn Leu Val Val Asp Leu Ser Thr Gln Ile Phe Cys His Asn Asp Tyr			
35	40	45	
Pro Glu Thr Ile Thr Asp Tyr Val Thr Leu Gln Arg Gly Ser Ala Tyr			
50	55	60	
Gly Gly Val Leu Ser Asn Phe Ser Gly Thr Val Lys Tyr Ser Gly Ser			
65	70	75	80
Ser Tyr Pro Phe Pro Thr Thr Ser Glu Thr Pro Arg Val Val Tyr Asn			
85	90	95	
Ser Arg Thr Asp Lys Pro Trp Pro Val Ala Leu Tyr Leu Thr Pro Val			
100	105	110	
Ser Ser Ala Gly Gly Leu Val Ile Lys Ala Gly Ser Leu Ile Ala Val			
115	120	125	
Leu Ile Leu Arg Gln Thr Asn Asn Tyr Asn Ser Asp Asp Phe Gln Phe			
130	135	140	
Val Trp Asn Ile Tyr Ala Asn Asn Asp Val Val Val Pro Thr Gly Gly			
145	150	155	160
Cys Asp Val Ser Ala Arg Asp Val Thr Val Thr Leu Pro Asp Tyr Arg			
165	170	175	
Gly Ser Val Pro Ile Pro Leu Thr Val Tyr Cys Ala Lys Ser Gln Asn			
180	185	190	
Leu Gly Tyr Tyr Leu Ser Gly Thr His Ala Asp Ala Gly Asn Ser Ile			
195	200	205	
Phe Thr Asn Thr Ala Ser Phe Ser Pro Ala Gln Gly Val Gly Val Gln			
210	215	220	
Leu Thr Arg Asn Gly Thr Ile Ile Pro Thr Asn Asn Thr Val Ser Leu			
225	230	235	240
Gly Ala Val Gly Thr Ser Ala Val Ser Leu Gly Leu Thr Ala Asn Tyr			
245	250	255	
Ala Arg Thr Gly Gly Gln Val Thr Ala Gly Asn Val Gln Ser Ile Ile			
260	265	270	
Gly Val Thr Phe Val Tyr Gln			
275			

<210> 30
<211> 280
<212> PRT
<213> E. coli

<400> 30
Phe Ala Cys Lys Thr Ala Asn Gly Thr Ala Ile Pro Ile Gly Gly Gly
1 5 10 15

Ser Ala Asn Val Tyr Val Asn Leu Ala Pro Ala Val Asn Val Gly Gln
20 25 30

Asn Leu Val Val Asp Leu Ser Thr Gln Thr Phe Cys His Asn Asp Tyr
35 40 45

Pro Glu Thr Ile Thr Asp Tyr Val Thr Leu Gln Arg Gly Ser Ala Tyr
50 55 60

Gly Gly Val Leu Ser Asn Phe Ser Gly Thr Val Lys Tyr Ser Gly Ser
65 70 75 80

Ser Tyr Pro Phe Pro Thr Thr Ser Glu Thr Pro Arg Val Val Tyr Asn
85 90 95

Ser Arg Thr Asp Lys Pro Trp Pro Val Ala Leu Tyr Leu Thr Pro Val
100 105 110

Ser Ser Ala Gly Gly Val Ala Ile Lys Ala Gly Ser Leu Ile Ala Val
115 120 125

Leu Ile Leu Arg Gln Thr Asn Asn Tyr Asn Ser Asp Asp Phe Gln Phe
130 135 140

Val Trp Asn Ile Tyr Ala Asn Asn Asp Val Val Val Pro Thr Gly Gly
145 150 155 160

Cys Asp Val Ser Ala His Asp Val Thr Val Thr Leu Pro Asp Tyr Arg
165 170 175

Gly Ser Val Pro Ile Pro Leu Thr Val Tyr Cys Ala Lys Ser Gln Asn
180 185 190

Leu Gly Tyr Tyr Leu Ser Gly Thr His Ala Asp Ala Gly Asn Ser Ile
195 200 205

Phe Thr Asn Thr Ala Ser Phe Ser Pro Ala Gln Gly Val Gly Val Gln
210 215 220

Leu Thr Arg Asn Gly Thr Ile Ile Pro Ala Asn Asn Thr Val Ser Leu
225 230 235 240

Gly Ala Val Gly Thr Ser Ala Val Ser Leu Gly Leu Thr Ala Asn Tyr
245 250 255

Ala Arg Thr Gly Gly Gln Val Thr Ala Gly Asn Val Gln Ser Ile Ile
260 265 270

Gly Val Thr Phe Val Tyr Gln Glx
275 280

<210> 31
<211> 279

<212> PRT
<213> E. coli

<400> 31
Phe Ala Cys Lys Thr Ala Asn Gly Thr Ala Ile Pro Ile Gly Gly Gly
1 5 10 15

Ser Ala Asn Val Tyr Val Asn Leu Ala Pro Ala Val Asn Val Gly Gln
20 25 30

Asn Leu Val Val Asp Leu Ser Thr Gln Ile Phe Cys His Asn Asp Tyr
35 40 45

Pro Glu Thr Ile Thr Asp Tyr Val Thr Leu Gln Arg Gly Ser Ala Tyr
50 55 60

Gly Gly Val Leu Ser Ser Phe Ser Gly Thr Val Lys Tyr Asn Gly Ser
65 70 75 80

Ser Tyr Pro Phe Pro Thr Thr Ser Glu Thr Pro Arg Val Val Tyr Asn
85 90 95

Ser Arg Thr Asp Lys Pro Trp Pro Val Ala Leu Tyr Leu Thr Pro Val
100 105 110

Ser Ser Ala Gly Gly Val Ala Ile Lys Ala Gly Ser Leu Ile Ala Val
115 120 125

Leu Ile Leu Arg Gln Thr Asn Asn Tyr Asn Ser Asp Asp Phe Gln Phe
130 135 140

Val Trp Asn Ile Tyr Ala Asn Asn Asp Val Val Val Pro Thr Gly Gly
145 150 155 160

Cys Asp Ala Ser Ala Arg Asp Val Thr Val Thr Leu Pro Asp Tyr Arg
165 170 175

Gly Ser Val Pro Ile Pro Leu Thr Val Tyr Cys Ala Lys Ser Gln Asn
180 185 190

Leu Gly Tyr Tyr Leu Ser Gly Thr His Ala Asp Ala Gly Asn Ser Ile
195 200 205

Phe Thr Asn Thr Ala Ser Phe Ser Pro Ala Gln Gly Val Gly Val Gln
210 215 220

Leu Thr Arg Asn Gly Thr Ile Ile Pro Ala Asn Asn Thr Val Ser Leu
225 230 235 240

Gly Ala Val Gly Thr Ser Ala Val Ser Leu Gly Leu Thr Ala Asn Tyr
245 250 255

Ala Arg Thr Gly Gly Gln Val Thr Ala Gly Asn Val Gln Ser Ile Ile
260 265 270

Gly Val Thr Phe Val Tyr Gln
275

<210> 32
 <211> 279
 <212> PRT
 <213> E. coli

<400> 32
 Phe Ala Cys Lys Thr Ala Asn Gly Thr Ala Ile Pro Ile Gly Gly Gly
 1 5 10 15

Ser Ala Asn Val Tyr Val Asn Leu Ala Pro Ala Val Asn Val Gly Gln
 20 25 30

Asn Leu Val Val Asp Leu Ser Thr Gln Ile Phe Cys His Asn Asp Tyr
 35 40 45

Pro Glu Thr Ile Thr Asp Tyr Val Thr Leu Gln Arg Gly Ser Ala Tyr
 50 55 60

Gly Gly Val Leu Ser Asn Phe Ser Gly Thr Val Lys Tyr Ser Gly Ser
 65 70 75 80

Ser Tyr Pro Phe Pro Thr Thr Ser Glu Thr Pro Arg Val Val Tyr Asn
 85 90 95

Ser Arg Thr Asp Lys Pro Trp Pro Val Ala Leu Tyr Leu Thr Pro Val
 100 105 110

Ser Ser Ala Gly Gly Val Val Ile Lys Ala Gly Ser Leu Ile Ala Val
 115 120 125

Leu Ile Leu Arg Gln Thr Asn Asn Tyr Asn Ser Asp Asp Phe Gln Phe
 130 135 140

Val Trp Asn Ile Tyr Ala Asn Asn Asp Val Val Val Pro Thr Gly Gly
 145 150 155 160

Cys Asp Val Ser Ala Arg Asp Val Thr Val Thr Leu Pro Asp Tyr Pro
 165 170 175

Gly Ser Val Pro Ile Pro Leu Thr Val Tyr Cys Ala Lys Ser Gln Asn
 180 185 190

Leu Gly Tyr Tyr Leu Ser Gly Thr Thr Ala Asp Ala Gly Asn Ser Ile
 195 200 205

Phe Thr Asn Thr Ala Ser Phe Ser Pro Ala Gln Gly Val Gly Val Gln
 210 215 220

Leu Thr Arg Asn Gly Thr Ile Ile Pro Ala Asn Asn Thr Val Ser Leu
 225 230 235 240

Gly Ala Val Gly Thr Ser Ala Val Ser Leu Gly Leu Thr Ala Asn Tyr
 245 250 255

Ala Arg Thr Gly Gly Gln Val Thr Ala Gly Asn Val Gln Ser Ile Ile
 260 265 270

Gly Val Thr Phe Val Tyr Gln

<210> 33
<211> 279
<212> PRT
<213> E. coli

<400> 33
Phe Ala Cys Lys Thr Ala Asn Gly Thr Ala Ile Pro Ile Gly Gly Gly
1 5 10 15
Ser Ala Asn Val Tyr Val Asn Leu Ala Pro Ala Val Asn Val Gly Gln
20 25 30
Asn Leu Val Val Asp Leu Ser Thr Gln Ile Phe Cys His Asn Asp Tyr
35 40 45
Pro Glu Thr Ile Thr Asp Tyr Val Thr Leu Gln Arg Gly Ala Ala Tyr
50 55 60
Gly Gly Val Leu Ser Ser Phe Ser Gly Thr Val Lys Tyr Asn Gly Ser
65 70 75 80
Ser Tyr Pro Phe Pro Thr Thr Ser Glu Thr Pro Arg Val Val Tyr Asn
85 90 95
Ser Arg Thr Asp Lys Pro Trp Pro Val Ala Leu Tyr Leu Thr Pro Val
100 105 110
Ser Ser Ala Gly Gly Val Ala Ile Lys Ala Gly Ser Leu Ile Ala Val
115 120 125
Leu Ile Leu Arg Gln Thr Asn Asn Tyr Asn Ser Asp Asp Phe Gln Phe
130 135 140
Val Trp Asn Ile Tyr Ala Asn Asn Asp Val Val Val Pro Thr Gly Gly
145 150 155 160
Cys Asp Val Ser Ala Arg Asp Val Thr Val Thr Leu Pro Asp Tyr Pro
165 170 175
Gly Ser Val Pro Ile Pro Leu Thr Val Tyr Cys Ala Lys Ser Gln Asn
180 185 190
Leu Gly Tyr Tyr Leu Ser Gly Thr Thr Ala Asp Ala Gly Asn Ser Ile
195 200 205
Phe Thr Asn Thr Ala Ser Phe Ser Pro Ala Gln Gly Val Gly Val Gln
210 215 220
Leu Thr Arg Asn Gly Thr Ile Ile Pro Ala Asn Asn Thr Val Ser Leu
225 230 235 240
Gly Ala Val Gly Thr Ser Ala Val Ser Leu Gly Leu Thr Ala Asn Tyr
245 250 255
Ala Arg Thr Gly Gly Gln Val Thr Ala Gly Asn Val Gln Ser Ile Ile
260 265 270

Gly Val Thr Phe Val Tyr Gln
275

<210> 34
<211> 279
<212> PRT
<213> E. coli

<400> 34
Phe Ala Cys Lys Thr Ala Asn Gly Thr Ala Ile Pro Ile Gly Gly Gly
1 5 10 15

Ser Ala Asn Val Tyr Val Asn Leu Ala Pro Val Val Asn Val Gly Gln
20 25 30

Asn Leu Val Val Asp Leu Ser Thr Gln Ile Phe Cys His Asn Asp Tyr
35 40 45

Pro Glu Thr Ile Thr Asp Tyr Val Thr Leu Gln Arg Gly Ser Ala Tyr
50 55 60

Gly Gly Val Leu Ser Asn Phe Ser Gly Thr Val Lys Tyr Ser Gly Ser
65 70 75 80

Ser Tyr Pro Phe Pro Thr Thr Ser Glu Thr Pro Arg Val Val Tyr Asn
85 90 95

Ser Arg Thr Asp Lys Pro Trp Pro Val Ala Leu Tyr Leu Thr Pro Val
100 105 110

Ser Ser Ala Gly Gly Val Ala Ile Lys Ala Gly Ser Leu Ile Ala Val
115 120 125

Leu Ile Leu Arg Gln Thr Asn Asn Tyr Asn Ser Asp Asp Phe Gln Phe
130 135 140

Val Trp Asn Ile Tyr Ala Asn Asn Asp Val Val Val Pro Thr Gly Gly
145 150 155 160

Cys Asp Val Ser Ala Arg Asp Val Thr Val Thr Leu Pro Asp Tyr Pro
165 170 175

Gly Ser Val Pro Ile Pro Leu Thr Val Tyr Cys Ala Lys Ser Gln Asn
180 185 190

Leu Gly Tyr Tyr Leu Ser Gly Thr Thr Ala Asp Ala Gly Asn Ser Ile
195 200 205

Phe Thr Asn Thr Ala Ser Phe Ser Pro Ala Gln Gly Val Gly Val Gln
210 215 220

Leu Thr Arg Asn Gly Thr Ile Ile Pro Ala Asn Asn Thr Val Ser Leu
225 230 235 240

Gly Ala Val Gly Thr Ser Ala Val Ser Leu Gly Leu Thr Ala Asn Tyr
245 250 255

Ala Arg Thr Gly Gly Gln Val Thr Ala Gly Asn Val Gln Ser Ile Ile
260 265 270

Gly Val Thr Phe Val Tyr Gln
275

<210> 35
<211> 279
<212> PRT
<213> E. coli

<400> 35
Phe Ala Cys Lys Thr Ala Asn Gly Thr Ala Ile Pro Ile Gly Gly Gly
1 5 10 15

Ser Ala Asn Val Tyr Val Asn Leu Ala Pro Ala Val Asn Val Gly Gln
20 25 30

Asn Leu Val Val Asp Leu Ser Thr Gln Ile Phe Cys His Asn Asp Tyr
35 40 45

Pro Glu Thr Ile Thr Asp Tyr Val Thr Leu Gln Arg Gly Ser Ala Tyr
50 55 60

Gly Ser Val Leu Ser Ser Phe Ser Gly Thr Val Lys Tyr Asn Gly Ser
65 70 75 80

Ser Tyr Pro Phe Pro Thr Thr Ser Glu Thr Pro Arg Val Val Tyr Asn
85 90 95

Ser Arg Thr Asp Lys Pro Trp Pro Val Ala Leu Tyr Leu Thr Pro Val
100 105 110

Ser Ser Ala Gly Gly Val Ala Ile Lys Ala Gly Ser Leu Ile Ala Val
115 120 125

Leu Ile Leu Arg Gln Thr Asn Asn Tyr Asn Ser Asp Asp Phe Gln Phe
130 135 140

Val Trp Asn Ile Tyr Ala Asn Asn Asp Val Val Val Pro Thr Gly Gly
145 150 155 160

Cys Asp Val Ser Ala Arg Asp Val Thr Val Thr Leu Pro Asp Tyr Arg
165 170 175

Gly Ser Val Pro Ile Pro Leu Thr Val Tyr Cys Ala Lys Ser Gln Asn
180 185 190

Leu Gly Tyr Tyr Leu Ser Gly Thr His Ala Asp Ala Gly Asn Ser Ile
195 200 205

Phe Thr Asn Thr Ala Ser Phe Ser Pro Ala Gln Gly Val Gly Val Gln
210 215 220

Leu Thr Arg Asn Gly Thr Ile Ile Pro Ala Asn Asn Thr Val Ser Leu
225 230 235 240

Gly Ala Val Gly Thr Ser Ala Val Ser Leu Gly Leu Thr Ala Asn Tyr

	245	250	255
Ala Arg Thr Gly Gly Gln Val Thr Ala Gly Asn Val Gln Ser Ile Ile			
260	265	270	
Gly Val Thr Phe Val Tyr Gln			
275			
<210> 36			
<211> 279			
<212> PRT			
<213> E. coli			
<400> 36			
Phe Ala Cys Lys Thr Ala Asn Gly Thr Ala Ile Pro Ile Gly Gly Gly			
1	5	10	15
Ser Ala Asn Val Tyr Val Asn Leu Ala Pro Val Val Asn Val Gly Gln			
20	25	30	
Asn Leu Val Val Asp Leu Ser Thr Gln Ile Phe Cys His Asn Asp Tyr			
35	40	45	
Pro Glu Thr Ile Thr Asp Tyr Val Thr Leu Gln Arg Gly Ser Ala Tyr			
50	55	60	
Gly Gly Val Leu Ser Asn Phe Ser Gly Thr Val Lys Tyr Ser Gly Ser			
65	70	75	80
Ser Tyr Pro Phe Pro Thr Thr Ser Glu Thr Pro Arg Val Val Tyr Asn			
85	90	95	
Ser Arg Thr Asp Lys Pro Trp Pro Val Ala Leu Tyr Leu Thr Pro Val			
100	105	110	
Ser Ser Ala Gly Gly Val Val Ile Lys Ala Gly Ser Leu Ile Ala Val			
115	120	125	
Leu Ile Leu Arg Gln Thr Asn Asn Tyr Asn Ser Asp Asp Phe Gln Phe			
130	135	140	
Val Trp Asn Ile Tyr Ala Asn Asn Asp Val Val Val Pro Thr Gly Gly			
145	150	155	160
Cys Asp Val Ser Ala Arg Asp Val Thr Val Thr Leu Pro Asp Tyr Arg			
165	170	175	
Gly Ser Val Pro Ile Pro Leu Thr Val Tyr Cys Ala Lys Ser Gln Asn			
180	185	190	
Leu Gly Tyr Tyr Leu Ser Gly Thr His Ala Asp Ala Gly Asn Ser Ile			
195	200	205	
Phe Thr Asn Thr Ala Ser Phe Ser Pro Ala Gln Gly Val Gly Val Gln			
210	215	220	
Leu Thr Arg Asn Gly Thr Ile Ile Pro Ala Asn Asn Thr Val Ser Leu			
225	230	235	240

Gly Ala Val Gly Thr Ser Ala Val Ser Leu Gly Leu Thr Ala Asn Tyr
 245 250 255
 Ala Arg Thr Gly Gly Gln Val Thr Ala Gly Asn Val Arg Ser Ile Ile
 260 265 270
 Ala Val Thr Phe Val Tyr Gln
 275
 <210> 37
 <211> 279
 <212> PRT
 <213> E. coli
 <400> 37
 Phe Ala Cys Lys Thr Ala Asn Gly Thr Ala Ile Pro Ile Gly Gly
 1 5 10 15
 Ser Ala Asn Val Tyr Val Asn Leu Ala Pro Ala Val Asn Val Gly Gln
 20 25 30
 Asn Leu Val Val Asp Leu Ser Thr Gln Ile Phe Cys His Asn Asp Tyr
 35 40 45
 Pro Glu Thr Ile Thr Asp Tyr Val Thr Leu Gln Arg Gly Ser Ala Tyr
 50 55 60
 Gly Gly Val Leu Ser Asn Phe Ser Gly Thr Val Glu Tyr Ser Gly Ser
 65 70 75 80
 Ser Tyr Pro Phe Pro Thr Thr Ser Glu Thr Pro Arg Val Val Tyr Asn
 85 90 95
 Ser Arg Thr Asp Lys Pro Trp Pro Val Ala Leu Tyr Leu Thr Pro Val
 100 105 110
 Ser Ser Ala Gly Gly Val Ala Ile Lys Ala Gly Ser Leu Ile Ala Val
 115 120 125
 Leu Ile Leu Arg Gln Thr Asn Asn Tyr Asn Ser Asp Asp Phe Gln Phe
 130 135 140
 Val Trp Asn Ile Tyr Ala Asn Asn Asp Val Val Val Pro Thr Gly Gly
 145 150 155 160
 Cys Asp Val Ser Ala Arg Asp Val Thr Val Thr Leu Pro Asp Tyr Arg
 165 170 175
 Gly Ser Val Pro Ile Pro Leu Thr Val Tyr Cys Ala Lys Ser Gln Asn
 180 185 190
 Leu Gly Tyr Tyr Leu Ser Gly Thr His Ala Asp Ala Gly Asn Ser Ile
 195 200 205
 Phe Thr Asn Thr Ala Ser Phe Ser Pro Ala Gln Gly Val Gly Val Gln
 210 215 220

Leu Thr Arg Asn Gly Thr Ile Ile Pro Ala Asn Asn Thr Val Ser Leu
225 230 235 240

Gly Ala Val Gly Thr Ser Ala Val Ser Leu Gly Leu Thr Ala Asn Tyr
245 250 255

Ala Arg Thr Gly Gly Gln Val Thr Ala Gly Asn Val Gln Ser Ile Ile
260 265 270

Gly Val Thr Phe Val Tyr Gln
275

<210> 38
<211> 279
<212> PRT
<213> E. coli

<400> 38
Phe Ala Cys Lys Thr Ala Asn Gly Thr Ala Ile Pro Ile Gly Gly Gly
1 5 10 15

Ser Ala Asn Val Tyr Val Asn Leu Ala Pro Ala Val Asn Val Gly Gln
20 25 30

Asn Leu Val Val Asp Leu Ser Thr Gln Ile Phe Cys His Asn Asp Tyr
35 40 45

Pro Glu Thr Ile Thr Asp Tyr Val Thr Leu Gln Arg Gly Ser Ala Tyr
50 55 60

Gly Gly Val Leu Ser His Phe Ser Gly Thr Val Lys Tyr Ser Gly Ser
65 70 75 80

Ser Tyr Pro Phe Pro Thr Thr Ser Glu Thr Pro Arg Val Val Tyr Asn
85 90 95

Ser Arg Thr Asp Lys Pro Trp Pro Val Ala Leu Tyr Leu Thr Pro Val
100 105 110

Ser Ser Ala Gly Gly Val Ala Ile Lys Ala Gly Ser Leu Met Ala Val
115 120 125

Leu Ile Leu Arg Gln Thr Asn Asn Tyr Asn Ser Asp Asp Phe Gln Phe
130 135 140

Val Trp Asn Ile Tyr Ala Asn Asn Asp Val Val Val Pro Thr Gly Gly
145 150 155 160

Cys Asp Val Ser Ala Arg Asp Val Thr Val Thr Leu Pro Asp Tyr Arg
165 170 175

Gly Ser Val Pro Ile Pro Leu Thr Val Tyr Cys Ala Lys Ser Gln Asn
180 185 190

Leu Gly Tyr Tyr Leu Ser Gly Thr His Ala Asp Ala Gly Asn Ser Ile
195 200 205

Phe Thr Asn Thr Ala Ser Phe Ser Pro Ala Gln Gly Val Gly Val Gln

210	215	220
Leu Thr Arg Asn Gly Thr Ile Asn Pro Ala Asn Asn Thr Val Ser Leu		
225	230	235
Gly Ala Val Gly Thr Ser Ala Val Ser Leu Gly Leu Thr Ala Asn Tyr		
245	250	255
Ala Arg Thr Gly Gly Gln Val Thr Ala Gly Asn Val Gln Ser Ile Ile		
260	265	270
Gly Val Thr Phe Val Tyr Gln		
275		
<210> 39		
<211> 279		
<212> PRT		
<213> E. coli		
<400> 39		
Phe Ala Cys Lys Thr Ala Asn Gly Thr Ala Ile Pro Ile Gly Gly		
1	5	10
15		
Ser Ala Asn Val Tyr Val Asn Leu Ala Pro Ala Val Asn Val Gly Gln		
20	25	30
Asn Leu Val Val Asp Leu Ser Thr Gln Ile Phe Cys His Asn Asp Tyr		
35	40	45
Pro Glu Thr Ile Thr Asp Tyr Val Thr Leu Gln Arg Gly Ser Ala Tyr		
50	55	60
Gly Gly Val Leu Ser Asn Phe Ser Gly Thr Val Lys Tyr Ser Gly Ser		
65	70	75
80		
Ser Tyr Pro Phe Pro Thr Thr Ser Glu Thr Pro Arg Val Val Tyr Asn		
85	90	95
Ser Arg Thr Asp Lys Pro Trp Pro Val Ala Leu Tyr Leu Thr Pro Val		
100	105	110
Ser Ser Ala Gly Gly Val Ala Ile Lys Ala Gly Ser Leu Ile Ala Val		
115	120	125
Leu Ile Leu Arg Gln Thr Asn Asn Tyr Asn Ser Asp Asp Phe Gln Phe		
130	135	140
Val Trp Asn Ile Tyr Ala Asn Asn Asp Val Val Val Pro Thr Gly Gly		
145	150	155
160		
Cys Asp Val Ser Val Arg Asp Val Thr Val Ile Leu Pro Asp Tyr Arg		
165	170	175
Gly Ser Val Pro Ile Pro Leu Thr Val Tyr Cys Ala Lys Ser Gln Asn		
180	185	190
Leu Gly Tyr Tyr Leu Ser Gly Thr His Ala Asp Ala Gly Asn Ser Ile		
195	200	205

Phe Thr Asn Thr Ala Ser Phe Ser Pro Ala Gln Gly Val Gly Val Gln
 210 215 220
 Leu Thr Arg Asn Gly Thr Ile Ile Pro Ala Asn Asn Thr Val Ser Leu
 225 230 235 240
 Gly Ala Val Gly Thr Ser Ala Val Ser Leu Gly Leu Thr Ala Asn Tyr
 245 250 255
 Ala Arg Thr Gly Gly Gln Val Thr Ala Gly Asn Val Lys Ser Ile Ile
 260 265 270
 Gly Val Thr Phe Val Tyr Gln
 275
 <210> 40
 <211> 279
 <212> PRT
 <213> E. coli
 <400> 40
 Phe Ala Cys Lys Thr Ala Asn Gly Thr Ala Ile Pro Ile Gly Gly
 1 5 10 15
 Ser Ala Asn Val Tyr Val Asn Leu Ala Pro Ala Val Asn Val Gly Gln
 20 25 30
 Asn Leu Val Val Asp Leu Ser Thr Gln Ile Phe Cys His Asn Asp Tyr
 35 40 45
 Pro Glu Thr Ile Thr Asp Tyr Val Thr Leu Gln Arg Gly Ser Ala Tyr
 50 55 60
 Gly Gly Val Leu Ser Ser Phe Ser Gly Thr Val Lys Tyr Asn Gly Ser
 65 70 75 80
 Ser Tyr Pro Phe Pro Thr Thr Ser Glu Thr Pro Arg Val Val Tyr Asn
 85 90 95
 Ser Arg Thr Asp Lys Pro Trp Pro Val Ala Leu Tyr Leu Thr Pro Val
 100 105 110
 Ser Ser Ala Gly Gly Val Ala Ile Lys Ala Gly Ser Leu Ile Ala Val
 115 120 125
 Leu Ile Leu Arg Gln Thr Asn Asn Tyr Asn Ser Asp Asp Phe Gln Phe
 130 135 140
 Val Trp Asn Ile Tyr Ala Asn Asn Asp Val Val Val Pro Thr Gly Gly
 145 150 155 160
 Cys Asp Val Ser Ala Arg Asp Val Thr Val Thr Leu Pro Asp Tyr Arg
 165 170 175
 Gly Ser Val Pro Ile Pro Leu Thr Val Tyr Cys Ala Lys Ser Gln Asn
 180 185 190

Leu Gly Tyr Tyr Leu Ser Gly Thr His Ala Asp Ala Gly Asn Ser Ile
 195 200 205
 Phe Thr Asn Thr Ala Ser Phe Ser Pro Ala Gln Gly Val Gly Val Gln
 210 215 220
 Leu Thr Ala Asn Gly Thr Ile Val Pro Ala Asn Asn Thr Val Ser Leu
 225 230 235 240
 Gly Ala Val Gly Thr Ser Ala Val Ser Leu Gly Leu Thr Ala Asn Tyr
 245 250 255
 Ala Arg Thr Gly Gly Gln Val Thr Ala Gly Asn Val Gln Ser Ile Ile
 260 265 270
 Gly Val Thr Phe Val Tyr Gln
 275
 <210> 41
 <211> 279
 <212> PRT
 <213> E. coli
 <400> 41
 Phe Ala Cys Lys Thr Ala Asn Gly Thr Ala Ile Pro Ile Gly Gly Gly
 1 5 10 15
 Ser Ala Asn Val Tyr Val Asn Leu Ala Pro Ala Val Asn Val Gly Gln
 20 25 30
 Asn Leu Val Val Asp Leu Ser Thr Gln Ile Phe Cys His Asn Asp Tyr
 35 40 45
 Pro Glu Thr Ile Thr Asp Tyr Val Thr Leu Gln Arg Gly Ser Ala Tyr
 50 55 60
 Gly Gly Val Leu Ser Ser Phe Ser Gly Thr Val Lys Tyr Asn Gly Ser
 65 70 75 80
 Ser Tyr Pro Phe Pro Thr Thr Ser Glu Thr Pro Arg Val Val Tyr Asn
 85 90 95
 Ser Arg Thr Asp Lys Pro Trp Pro Val Ala Leu Tyr Leu Thr Leu Val
 100 105 110
 Ser Ser Ala Gly Gly Val Ala Ile Lys Ala Gly Ser Leu Ile Ala Val
 115 120 125
 Leu Ile Leu Arg Gln Thr Asn Asn Tyr Asn Ser Asp Asp Phe Gln Phe
 130 135 140
 Val Trp Asn Ile Tyr Ala Asn Asp Val Val Val Pro Thr Gly Gly
 145 150 155 160
 Cys Asp Val Ser Ala Arg Asp Val Thr Val Thr Leu Pro Asp Tyr Arg
 165 170 175
 Gly Ser Val Pro Ile Pro Leu Thr Val Tyr Cys Ala Lys Ser Gln Asn

180 185 190

Leu Gly Tyr Tyr Leu Ser Gly Thr His Ala Asp Ala Gly Asn Ser Ile
 195 200 205

Phe Thr Asn Thr Ala Ser Phe Ser Pro Ala Gln Gly Val Gly Val Gln
 210 215 220

Leu Thr Arg Asn Gly Thr Ile Ile Pro Ala Asn Asn Thr Val Ser Leu
 225 230 235 240

Gly Ala Val Gly Thr Ser Ala Val Ser Leu Gly Leu Thr Ala Asn Tyr
 245 250 255

Ala Arg Thr Gly Gly Gln Val Thr Ala Gly Asn Val Gln Ser Ile Ile
 260 265 270

Gly Val Thr Phe Val Tyr Gln
 275

<210> 42
<211> 279
<212> PRT
<213> E. coli

<400> 42
Phe Ala Cys Lys Thr Ala Asn Gly Thr Ala Ile Pro Ile Gly Gly Gly
 1 5 10 15

Ser Ala Asn Val Tyr Val Asn Leu Ala Pro Val Val Asn Val Gly Gln
 20 25 30

Asn Leu Val Val Asp Leu Ser Thr Gln Ile Phe Cys His Asn Asp Tyr
 35 40 45

Pro Glu Thr Ile Thr Asp Tyr Val Thr Leu Gln Arg Gly Ser Ala Tyr
 50 55 60

Gly Gly Val Leu Ser Asn Phe Ser Gly Thr Val Lys Tyr Asn Gly Ser
 65 70 75 80

Ser Tyr Pro Phe Pro Thr Ser Glu Thr Pro Arg Val Val Tyr Asn
 85 90 95

Ser Arg Thr Asp Lys Pro Trp Pro Val Ala Leu Tyr Leu Thr Pro Val
 100 105 110

Ser Ser Ala Gly Gly Val Ala Ile Lys Ala Gly Ser Leu Ile Ala Val
 115 120 125

Leu Ile Leu Arg Gln Thr Asn Asn Tyr Asn Ser Asp Asp Phe Gln Phe
 130 135 140

Val Trp Asn Ile Tyr Ala Asn Asn Asp Val Val Val Pro Thr Gly Gly
 145 150 155 160

Cys Asp Val Ser Ala Arg Asp Val Thr Val Thr Leu Pro Asp Tyr Arg
 165 170 175

Gly Ser Val Pro Ile Pro Leu Thr Val Tyr Cys Ala Lys Ser Gln Asn
180 185 190

Leu Gly Tyr Tyr Leu Ser Gly Thr His Ala Asp Ala Gly Asn Ser Ile
195 200 205

Phe Thr Asn Thr Ala Ser Phe Ser Pro Ala Gln Gly Val Gly Val Gln
210 215 220

Leu Thr Arg Asn Gly Thr Ile Ile Pro Ala Asn Asn Thr Val Ser Leu
225 230 235 240

Gly Ala Val Gly Thr Ser Ala Val Ser Leu Gly Leu Thr Ala Asn Tyr
245 250 255

Ala Arg Thr Gly Gly Gln Val Thr Ala Gly Asn Val Gln Ser Ile Ile
260 265 270

Gly Val Thr Phe Val Tyr Gln
275

<210> 43

<211> 279

<212> PRT

<213> E. coli

<400> 43

Phe Ala Cys Lys Thr Ala Asn Gly Thr Ala Ile Pro Ile Gly Gly
1 5 10 15

Ser Ala Asn Val Tyr Val Asn Leu Ala Pro Ala Val Asn Val Gly Gln
20 25 30

Asn Leu Val Val Asp Leu Ser Thr Gln Ile Phe Cys His Asn Asp Tyr
35 40 45

Pro Glu Thr Ile Thr Asp Tyr Val Thr Leu Gln Arg Gly Ser Ala Tyr
50 55 60

Gly Gly Val Leu Ser Asn Phe Ser Gly Thr Val Lys Tyr Ser Gly Ser
65 70 75 80

Ser Tyr Pro Phe Pro Thr Thr Ser Glu Thr Pro Arg Val Val Tyr Asn
85 90 95

Ser Arg Thr Asp Lys Pro Trp Pro Val Ala Leu Tyr Leu Thr Pro Val
100 105 110

Ser Ser Ala Gly Gly Val Ala Ile Lys Ala Gly Ser Leu Ile Ala Val
115 120 125

Leu Ile Leu Arg Gln Thr Lys Asn Tyr Asn Ser Asp Asp Phe Gln Phe
130 135 140

Val Trp Asn Ile Tyr Ala Asn Asn Asp Val Val Val Pro Thr Gly Gly
145 150 155 160

Cys Asp Val Ser Ala Arg Asp Val Thr Val Thr Leu Pro Asp Tyr Arg
 165 170 175

 Gly Ser Val Pro Ile Pro Leu Thr Val Tyr Cys Ala Lys Ser Gln Asn
 180 185 190

 Leu Gly Tyr Tyr Leu Ser Gly Thr His Ala Asp Ala Gly Asn Ser Ile
 195 200 205

 Phe Thr Asn Thr Ala Ser Phe Ser Pro Ala Gln Gly Val Gly Val Gln
 210 215 220

 Leu Thr Arg Asn Gly Thr Ile Ile Pro Ala Asn Asn Thr Val Ser Leu
 225 230 235 240

 Gly Thr Val Gly Thr Ser Ala Val Ser Leu Gly Leu Thr Ala Asn Tyr
 245 250 255

 Ala Arg Thr Gly Gly Gln Val Thr Ala Gly Asn Val Gln Ser Ile Ile
 260 265 270

 Gly Val Thr Phe Val Tyr Gln
 275

 <210> 44
 <211> 279
 <212> PRT
 <213> E. coli

 <400> 44
 Phe Ala Cys Lys Thr Ala Asn Gly Thr Ala Ile Pro Ile Gly Gly Gly
 1 5 10 15

 Ser Ala Asn Val Tyr Val Asn Leu Ala Pro Val Val Asn Val Gly Gln
 20 25 30

 Asn Leu Val Val Asp Leu Ser Thr Gln Ile Phe Cys His Asn Asp Tyr
 35 40 45

 Pro Glu Thr Ile Thr Asp Tyr Val Thr Leu Gln Arg Gly Ser Ala Tyr
 50 55 60

 Gly Gly Val Leu Ser Asn Phe Ser Gly Thr Val Lys Tyr Ser Gly Ser
 65 70 75 80

 Ser Tyr Pro Phe Pro Thr Thr Ser Glu Thr Pro Arg Val Val Tyr Asn
 85 90 95

 Ser Arg Thr Asp Lys Pro Trp Pro Val Ala Leu Tyr Leu Thr Pro Val
 100 105 110

 Ser Ser Ala Gly Gly Val Ala Ile Lys Ala Gly Ser Leu Ile Ala Val
 115 120 125

 Leu Ile Leu Arg Gln Thr Asn Asn Tyr Asn Ser Asp Asp Phe Gln Phe
 130 135 140

 Val Trp Asn Ile Tyr Ala Asn Asn Asp Val Val Val Pro Thr Gly Gly

145	150	155	160
Cys Asp Val Ser Ala Arg Asp Val Thr Val Thr Leu Pro Asp Tyr Pro			
165	170	175	
Gly Ser Val Pro Ile Pro Leu Thr Val Tyr Cys Ala Lys Ser Gln Asn			
180	185	190	
Leu Gly Tyr Tyr Leu Ser Gly Thr Thr Ala Asp Ala Gly Asn Ser Ile			
195	200	205	
Phe Thr Asn Thr Ala Ser Phe Ser Pro Ala Gln Gly Val Gly Val Gln			
210	215	220	
Leu Thr Arg Asn Gly Thr Ile Ile Pro Ala Asn Asn Thr Val Ser Leu			
225	230	235	240
Gly Ala Val Gly Thr Ser Ala Val Ser Leu Gly Leu Thr Ala Asn Tyr			
245	250	255	
Ala Arg Thr Gly Gly Gln Val Thr Ala Gly Asn Val Gln Ser Ile Ile			
260	265	270	
Gly Val Thr Phe Val Tyr Gln			
275			
<210> 45			
<211> 279			
<212> PRT			
<213> E. coli			
<400> 45			
Phe Ala Cys Lys Thr Ala Asn Gly Thr Ala Ile Pro Ile Gly Gly Gly			
1	5	10	15
Ser Ala Asn Val Tyr Val Asn Leu Ala Pro Ala Val Asn Val Gly Gln			
20	25	30	
Asn Leu Val Val Asp Leu Ser Thr Gln Ile Phe Cys His Asn Asp Tyr			
35	40	45	
Pro Glu Thr Ile Thr Asp Tyr Val Thr Leu Gln Arg Gly Ala Ala Tyr			
50	55	60	
Gly Gly Val Leu Ser Ser Phe Ser Gly Thr Val Lys Tyr Asn Gly Ser			
65	70	75	80
Ser Tyr Pro Phe Pro Thr Thr Ser Glu Thr Pro Arg Val Val Tyr Asn			
85	90	95	
Ser Arg Thr Asp Lys Pro Trp Pro Val Ala Leu Tyr Leu Thr Pro Val			
100	105	110	
Ser Ser Ala Gly Gly Val Ala Ile Lys Ala Gly Ser Leu Ile Ala Val			
115	120	125	
Leu Ile Leu Arg Gln Thr Asn Asn Tyr Asn Ser Asp Asp Phe Gln Phe			
130	135	140	

Val Trp Asn Ile Tyr Ala Asn Asn Asp Val Val Val Pro Thr Gly Gly
 145 150 155 160

Cys Asp Val Ser Ala Arg Asp Val Thr Val Thr Leu Pro Asp Tyr Arg
 165 170 175

Gly Ser Val Pro Ile Pro Leu Thr Val Tyr Cys Ala Lys Ser Gln Asn
 180 185 190

Leu Gly Tyr Tyr Leu Ser Gly Thr His Ala Asp Ala Gly Asn Ser Ile
 195 200 205

Phe Thr Asn Thr Ala Ser Phe Ser Pro Ala Gln Gly Val Gly Val Gln
 210 215 220

Leu Thr Arg Asn Gly Thr Ile Ile Pro Ala Asn Asn Thr Val Ser Leu
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Gly Ala Val Gly Thr Ser Ala Val Ser Leu Gly Leu Thr Ala Asn Tyr
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Ala Arg Thr Gly Gly Gln Val Thr Ala Gly Asn Val Gln Ser Ile Ile
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Gly Val Thr Phe Val Tyr Gln
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 <213> Artificial

<220>
 <223> Sequence of J96 fimC plus native signal sequence

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<220>
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<211> 1085
<212> DNA
<213> Artificial

<220>
<223> Sequence of Lac IQ

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<210> 51
<211> 862
<212> DNA
<213> Sequence of beta-lacyamase gene

<400> 51							
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<210> 52
 <211> 601
 <212> DNA
 <213> Artificial

<220>
 <223> Sequence of the origin of replication

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agataccaaa	tactgttctt	ctagttagc	cgtagctagg	ccaccacttc	aagaactctg	180
tagcaccgcc	tacatacctc	gctctgctaa	tcctgttacc	agtggctgct	gccagtgccg	240
ataagtctgt	tcttaccggg	ttggactcaa	gacgatagtt	accggataag	gcccagcgg	300
cggcgtgaac	gggggggtcg	tgcacacagc	ccagcttgg	gcgaacgacc	tacaccgaac	360
tgagataacct	acagcgtgag	ctatgagaaa	gcgcacgc	tcccaaggg	agaaaggcgg	420
acaggtatcc	ggtaagccgc	aggctcgaa	caggagagcg	cacgaggag	cttccagggg	480
gaaacgcctg	gtatcttat	agtccctgtcg	ggttgcaca	cctctgactt	gagcgtcgat	540
tttgtatg	ctcgtcaggg	ggcggagcc	tatggaaaaa	cgccagcaac	gcggcctttt	600
t						601

<210> 53
 <211> 116
 <212> DNA
 <213> Sequence of Lac p/o

<400> 53						
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<210> 54
 <211> 837
 <212> DNA
 <213> E. coli

<400> 54						
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tatgtaaacc	ttgcgc	ccgt	cgtaatgt	ggcaaaacc	tgtcg	120
caaatacttt	gccataac	ga	ttatccggaa	accattacag	actatgtc	180
ggctcg	gtt	atggcggc	gttatactt	tttccgg	ccgtaaaata	240
agctatccat	ttc	cttacc	cagcgaaac	ccgcgc	taatggc	300
aaggcgtgc	cgg	ttat	ttatgtac	gtgcgg	ggtggc	360
aaagctggc	tat	ttat	ttatgtac	gtgcgg	ggtggc	420
gatttcc	ttgtgtgg	aaat	tttacg	aatatgt	tgtgtgt	480
tgcgatgtt	ctg	ctgtgt	tgtcacc	actctgc	actacc	540
attcctcta	ccgtt	tatt	tgcgaaa	ctgg	cttgc	600
accgcagat	cg	ttt	actacc	tttgc	ccacagg	660
gtcggcgtac	at	ttt	tttgc	actacc	tttgc	720
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ggcaggtga	ct	ttt	tttgc	actacc	tttgc	837

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<210> 55
<211> 279
<212> PRT
<213> Artificial

<220>
<223> Consensus sequence of FimH proteins for SEQ ID NO: 23 to 45

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Phe Ala Cys Lys Thr Ala Asn Gly Thr Ala Ile Pro Ile Gly Gly Gly
1 5 10 15

Ser Ala Asn Val Tyr Val Asn Leu Ala Pro Ala Val Asn Val Gly Gln
20 25 30

Asn Leu Val Val Asp Leu Ser Thr Gln Ile Phe Cys His Asn Asp Tyr
35 40 45

Pro Glu Thr Ile Thr Asp Tyr Val Thr Leu Gln Arg Gly Ser Ala Tyr
50 55 60

Gly Gly Val Leu Ser Asn Phe Ser Gly Thr Val Lys Tyr Ser Gly Ser
65 70 75 80

Ser Tyr Pro Phe Pro Thr Thr Ser Glu Thr Pro Arg Val Val Tyr Asn
85 90 95

Ser Arg Thr Asp Lys Pro Trp Pro Val Ala Leu Tyr Leu Thr Pro Val
100 105 110

Ser Ser Ala Gly Gly Val Ala Ile Lys Ala Gly Ser Leu Ile Ala Val
115 120 125

Leu Ile Leu Arg Gln Thr Asn Asn Tyr Asn Ser Asp Asp Phe Gln Phe
130 135 140

Val Trp Asn Ile Tyr Ala Asn Asn Asp Val Val Val Pro Thr Gly Gly
145 150 155 160

Cys Asp Val Ser Ala Arg Asp Val Thr Val Thr Leu Pro Asp Tyr Arg
165 170 175

Gly Ser Val Pro Ile Pro Leu Thr Val Tyr Cys Ala Lys Ser Gln Asn
180 185 190

Leu Gly Tyr Tyr Leu Ser Gly Thr His Ala Asp Ala Gly Asn Ser Ile
195 200 205

Phe Thr Asn Thr Ala Ser Phe Ser Pro Ala Gln Gly Val Gly Val Gln
210 215 220

Leu Thr Arg Asn Gly Thr Ile Ile Pro Ala Asn Asn Thr Val Ser Leu
225 230 235 240

Gly Ala Val Gly Thr Ser Ala Val Ser Leu Gly Leu Thr Ala Asn Tyr
245 250 255

Ala Arg Thr Gly Gly Gln Val Thr Ala Gly Asn Val Gln Ser Ile Ile

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260

265

270

Gly Val Thr Phe Val Tyr Gln
275

<210> 56
<211> 55
<212> DNA
<213> Artificial

<220>
<223> Oligonucleotide primer GA1F

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55

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<211> 36
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<213> Artificial

<220>
<223> Oligonucleotide primer GA1R

<400> 57
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36

<210> 58
<211> 36
<212> DNA
<213> Artificial

<220>
<223> Oligonucleotide primer GA13F

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36

<210> 59
<211> 39
<212> DNA
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<220>
<223> Oligonucleotide primer GA6R

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39

<210> 60
<211> 30
<212> DNA
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DNA Sequence Database

<220>
<223> Oligonucleotide primer GA11F

<400> 60
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<210> 61
<211> 19
<212> DNA
<213> Artificial

<220>
<223> Oligonucleotide primer GA9R

<400> 61
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<210> 62
<211> 23
<212> DNA
<213> Artificial

<220>
<223> Oligonucleotide primer GA24F

<400> 62
tgctcacatg ttcttcctg cgt 23

<210> 63
<211> 34
<212> DNA
<213> Artificial

<220>
<223> Oligonucleotide primer GA23R

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<210> 64
<211> 37
<212> DNA
<213> Artificial

<220>
<223> Oligonucleotide primer GA21F

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